AMENDMENT AND RESPONSE UNDER 37 C.F.R § 1.111

Serial Number: 10/043,591

Filing Date: January 9, 2002

Title: METHOD AND APPARATUS FOR AUDIO LOUDNESS & DYNAMICS MATCHING

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## **IN THE CLAIMS**

Please amend the claims as follows:

1-21. (Cancelled)

22. (Currently Amended) A method of adjusting the dynamics of a digital audio track, the method implemented on a computerized system, comprising:

evaluating an audio track to determine the loudness levels of a plurality of frames in the audio track such that the loudness levels of the plurality of frames are representative of the loudness distribution of frames across the entire audio track;

determining an apparent loudness weighting for the plurality of frames of the audio track such that the weighting emphasizes the relatively greater effect that louder frames have on loudness perception, while including the contribution to overall loudness made by less loud frame; and

adjusting the loudness of the track based on the determined loudness levels and apparent loudness weighting of the plurality of frames so that the apparent loudness of the track matches a desired apparent loudness, the adjusting performed via a nonlinear compressor transfer function determined by estimating dynamic spread on the audio track with a calculated non-linear compressor transfer function applied by applying the calculated non-linear compressor transfer function to at least one of histogram or sample frame data.

- 23. (Previously Presented) The method of adjusting the dynamics of a digital audio track of claim 22, wherein evaluating an audio track to determine the distribution of loudness levels present in the audio track comprises determining levels for all frames comprising the audio track.
- 24. (Previously Presented) The method of adjusting the dynamics of a digital audio track of claim 22, wherein evaluating an audio track to determine loudness levels for a plurality of frames in the audio track comprises determining levels for frames sampled from across all frames comprising the audio track.

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25. (Previously Presented) The method of adjusting the dynamics of a digital audio track of

claim 22, wherein evaluating an audio track to determine loudness levels for a plurality of frames

in the audio track comprises determining levels for all frames in the audio track.

26. (Previously Presented) The method of adjusting the dynamics of a digital audio track of

claim 22, further comprising using an emphasis parameter to derive the apparent loudness weight

of an individual frame of the audio track such that the apparent loudness weight comprises the

emphasis parameter raised to the negative power of a loudness value for the frame.

27. (Previously Presented) The method of adjusting the dynamics of an audio track of claim

22, wherein at least one of evaluating an audio track to determine the loudness levels of a

plurality of frames and determining an apparent loudness weighting for the plurality of frames

comprises performing such calculations based on loudness value distribution information for the

audio track represented in a histogram.

28. (Previously Presented) The method of adjusting the dynamics of a digital audio track of

claim 22, wherein the apparent loudness weight is frequency-weighted to compensate for

perceived loudness differences at different frequencies.

29. (Previously Presented) The method of adjusting the dynamics of a digital audio track of

claim 22, wherein adjusting the loudness of the track comprises combining aggregated weighted

loudness values to determine apparent loudness for the track.

A method of adjusting the dynamics of a digital audio track, the 30. (Currently Amended) method implemented on a computerized system, comprising:

evaluating an audio track to determine the loudness levels of a plurality of frames in the audio track such that the loudness levels of the plurality of frames are representative of the loudness distribution of frames across the entire audio track;

using the loudness levels of a plurality of frames in the audio track to calculate a dynamic spread of the audio track;

determining a non-linear compressor transfer function configured to produce a desired dynamic spread by estimating dynamic spread on the audio track with a calculated non-linear compressor transfer function applied by applying the calculated non-linear compressor transfer function to at least one of histogram or sample frame data, the non-linear compressor transfer function comprising greater dynamic range compression at high loudness levels than that at low loudness levels; and

applying the determined non-linear compressor transfer function to the audio track to produce an audio track with the desired dynamic spread.

- 31. (Previously Presented) The method of adjusting the dynamics of a digital audio track of claim 30, further comprising adjusting the loudness of the track based on the determined loudness levels so that the apparent loudness of the track matches a desired apparent loudness.
- 32. (Previously Presented) The method of adjusting the dynamics of a digital audio track of claim 30, wherein a threshold between linear segments of the non-linear compressor transfer function is based on statistical analysis of audio track
- 33. (Previously Presented) The method of adjusting the dynamics of a digital audio track of claim 32, wherein the threshold is at specified percentile domain of loudness levels in the audio track.

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34. (Previously Presented) The method of adjusting the dynamics of a digital audio track of claim 32, further comprising normalizing the loudness of the specified percentile domain of loudness levels in audio track to a desired loudness level.

35. (Cancelled)

36. (Currently Amended) The method of adjusting the dynamics of a digital audio track of claim 30 [[35]], wherein the non-linear compressor transfer function is iteratively calculated to achieve a desired dynamic spread.